



St Albans & District Model Engineering Society

Dynamometer Project

Functional Specification Version 0.1 Draft

Introduction

The requirements listed in the following section enable version 1.0 of the dynamometer car to deliver the basic functionality necessary for use at club level in-line with the IMLEC rules and to be capable of development.

Version 1 Requirements

1	Easy to use, not requiring expertise in electronics or mechanical engineering
2	Two people can safely transport the dynamometer car from storage to track
3	Fully charged battery packs available at Puffing Park
4	Operates with 5" gauge locos on a raised track
5	Generates output in line with Model Engineer IMLEC calculations
6	Capable of operating for three hours on one battery pack

Version 1 Functionality

1	Records distance, speed and drawbar tension to a removable electronic media, e.g. SD Card or USB stick
2	From a seated position on their driving truck the locomotive driver can "start recording" and "stop recording" and "cancel recording" using a touch screen or switch control. There will be an indicator light to show whether the dynamometer car is in record mode or not.
3	The file name for each recorded run includes an integer that records the total number of recordings completed and the date and time the recording began.
4	Tension and compression will be recorded at the drawbar, with tension only contributing to the overall thermal efficiency calculation.
5	If there isn't sufficient space on the removable storage media to accommodate the data from a complete run of thirty minutes, it should be impossible to "start recording". In this case a warning light should come on to indicate insufficient storage available.
6	The dynamometer car shall have a clevis / slot type coupling at both ends that meet the Puffing Park regulations.
7	The dynamometer car needs to cope with very low and fluctuating drawbar forces through to the larger drawbar forces generated by the club's largest locomotives, in particular the East African.

8	The dynamometer car will have the appearance of a standard BR coach except that it will be painted yellow in the style of a Network Rail Measurement train. On each side will be the club logo and the words “St Albans & District Model Engineering Society Dynamometer Car” in black using the Rail Alphabet font.
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Version 2 Onwards Requirements

1	Recording of additional channels of data, e.g. temperatures, gas concentrations, smokebox vacuum etc
2	A screen available to position in front of the driver displaying relevant live data e.g. Current speed, current drawbar tension, current power output in addition to data from the additional sensors, so perhaps showing temperature of the exhaust. Ideally the data that can be displayed on the screen is under software control such that the overall display can be enhanced over time.
3	In the future it may be desirable to use the dynamometer car on a 7 ¼” track so there needs to be a method of adapting the gauge from 5”. It is assumed that 3 ½” locos will be accommodated at Puffing Field through use of the offset coupling between loco and driving truck, thus the dynamometer car connects 5” to 5” behind the driving truck.
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